UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

Reply to: SFD-3

# MEMO

**TO:** **Interagency Perchlorate Steering Committee Executive Committee-**
Peter Grevatt, USEPA/OSWER
Annie Jarabek, USEPA/NCEA
Kevin Mayer, USEPA/Region 9
Dan Rogers, DoD/USAF
Karen Wirth, USEPA/OGWDW

**FR:** **Catherine McCracken**
**DT:** **March 20, 2000**

**RE: Arizona Perchlorate Occurrence Study report**

Enclosed is your copy of an Arizona Department of Environmental Quality (ADEQ) report, "Arizona Perchlorate Occurrence Study, Drinking Water Sources, *Phase One*."

I have a call in to Brian Popadak, of the Program Development and Outreach Unit of ADEQ, to ask how the report has or will be distributed and when it might be added to the ADEQ web site.

Please note that the second paragraph of the preface of the document mentions the importance of the IPSC to ADEQ's efforts to better understand perchlorate occurrence in Arizona.

If you have any questions or need additional information, please do not hesitate to contact me at 415-744-2182.

Thank you.

# ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Governor Jane Dee Hull  Jacqueline E. Schafer, Director

March 16, 2000

Dear Perchlorate stakeholder:

Enclosed please find a copy of the *Arizona Perchlorate Occurrence Study - Phase One*. This report is the result of the cooperative efforts of the Arizona Department of Environmental Quality, the Arizona Department of Health Services, the Arizona Small Utilities Association, the Intertribal Council of Arizona, the City of Phoenix and several individual tribes along the Colorado River.

If you have questions about the report, please contact me a (602) 207-4511.

Sincerely,

Brian Popadak

Brian Popadak
Program Development and Outreach Unit
Drinking Water Section

Enclosure

# Arizona
# Perchlorate Occurrence Study
# Drinking Water Sources

*Phase One Sampling*
*April / May / July / August / September 1999*

## Water Quality Division
## Drinking Water Section

**Publication date: December 13, 1999**
**ADEQ Document Number: OFR 99-14**

# Arizona
# Perchlorate Occurrence Study
# Drinking Water Sources
## *Phase One*

**Mission**: The Department of Environmental Quality shall preserve, protect and enhance the environment and public health and shall be a leader in the development of public policy to maintain and improve the quality of Arizona's air, land and water resources.

**Report Prepared by:**


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ADEQ Document Number: OFR 99-14

# Table of Contents:

# Preface

This report was made possible through a cooperative partnership between ADEQ Drinking Water Section, the Arizona Small Utilities Association (ASUA), the Intertribal Council of Arizona (ITCA), the Fort Mohave Indian Tribe, Chemehuevi Indian Tribe, North Cocopah Tribal Council, the Colorado River Indian Tribes, the Arizona Department of Health Services (ADHS), the Arizona Department of Environmental Quality Southern Regional Office (SRO), the Arizona Department of Environmental Quality Northern Regional Office (NRO) and all those owners and operators of small rural water systems and municipalities who allowed the ASUA representative to enter their sites to collect samples for the study.

It must also be mentioned, with deep appreciation, that the Interagency Perchlorate Steering Committee (IPSC) sponsored the Perchlorate Stakeholders Forum. This sharing of ideas and pooling of scientific information from other states, as well as from the EPA, has been beneficial in understanding issues relating to perchlorate contamination, its occurrence and its effects on drinking water. It was through ADEQ's participation in the IPSC forum that the need to better understand the occurrence of perchlorate in drinking water sources in Arizona was identified.

This report is Phase One of a two-part report. This phase covers the time periods of high water usage in the summer which also corresponds to high volume dam releases along the Colorado River. Phase Two will be started in January 2000 and should conclude March 2000. It will cover winter water usage and a time period with normally low seasonal volume dam releases along the Colorado River. This is based upon the 1998 statistical information gathered from the Bureau of Land Management. It should also be recognized that the Colorado River not only serves as a source of drinking water for the majority of the population in Arizona, but it is also used as a source of water for agricultural and recreational uses.

For more information on perchlorate issues at the national level, or for other drinking water information, please visit these websites:

| | |
|---|---|
| EPA website | http://www.epa.gov/ogwdw/ccl/perchlor/perchlo.html |
| IPSC website | http://www.epa.gov/ogwdw/ccl/perchlor/ipsc.html |
| ADEQ website | http://www.adeq.state.az.us |
| ADHS website | http://www.hs.state.az.us/edc/ehpage.html |

# Executive Summary

Scope of this report:
The purpose of this document is to present a summary of perchlorate occurrence data collected at a number of drinking water sources used by public water systems in Arizona. This includes sampling points along the Colorado River, the Central Arizona Project (CAP) canal, groundwater wells near surface water sources, groundwater injection wells, and groundwater wells. This report is also intended to provide a foundation of scientific occurrence information that can be utilized for trend analysis, policy development, national rule writers or by risk analysis staff at the state and federal levels.

There are currently no regulatory levels for perchlorate in drinking water at the national or state level. As of the date of this report, the ADHS Office of Environmental Health has developed a Provisional Drinking Water Health Based Guidance Level (HBGL) of 31 parts per billion and is also about to publish a newborn risk study relating to perchlorate and drinking water sources. The ADHS newborn risk study has not been released as of date of this report. Inquiries should be made to the ADHS.

The levels of perchlorate in the drinking water sources contained in this report range from No Detect, which is defined as less than four parts per billion (<4 ppb), to 8.5 ppb. Lake Mead results range from No Detect (<4 ppb) to 480 ppb. The closer the sample points were to the Las Vegas Wash inlet into Lake Mead, the higher the perchlorate levels.

Historical Information - The Colorado River and Perchlorate:
This report is a more detailed occurrence study than a report concluded earlier this year by the EPA. In that study, the EPA conducted occurrence sampling along the Colorado River only. The EPA's sampling was conducted to help address issues raised by concerned citizens of Nevada, Arizona, California and the Indian Communities using the Colorado River for irrigation, agriculture and drinking purposes. The sampling time frame also had to do with availability and accuracy of laboratory methods. In February 1999, the EPA was provided with a more accurate laboratory method that could reach detection levels for perchlorate down to four parts per billion. Just months earlier the lowest level that could be reached by previous laboratory methods was 200 ppb. The EPA focused on the Colorado River because the river had become a recipient of a major source of perchlorate contamination from a waste site located in Henderson, Nevada.

Approximately ten years ago a major explosion occurred at a solid rocket fuel manufacturing plant in Henderson, Nevada. After the explosion, the soluble ammonium perchlorate found its way into the Las Vegas Wash. The Las Vegas Wash drains into Lake

Mead, which then feeds into the Colorado River as it flows through Hoover Dam. The higher concentrations of perchlorate occur in Nevada and in Lake Mead; lower concentrations are found in the Colorado River, downstream from Hoover Dam. As with any occurrence study, the data points are only pictures in time. The results do not necessarily represent the water quality of the sampling points under all conditions of flow.

Study Format:

This study is represented in text format, table format, GIS visual map format and is supplemented with laboratory documentation on the quality assurance, quality control information. In addition, site specific supplemental information was conducted at each sample point such as ambient air temperature, water temperature, conductivity, depth of sample measurement, global positioning documentation and corresponding zip codes. These additional data points were requested by several interested persons including the ADHS, Indian Tribes, and by ADEQ scientific and hydrological staff. This report does not attempt to correlate the supplemental scientific information to fluctuations in perchlorate levels. Phase Two may provide an opportunity to conduct trend analysis of the occurrence data to the temperature, depth, pH or conductivity of the source water, if any such scientific correlation exists.

Regulation of Perchlorate in Drinking Water:

The EPA's Drinking Water Program has published a draft federal rule which proposes to make perchlorate an unregulated constituent within the drinking water rules, so that national occurrence information can be collected by water systems throughout the nation. The EPA and the National Academy of Science are continuing their perchlorate toxicology review and risk characterization to human health as well as to the ecosystem. Updates on their human risk studies can be obtained on the EPA or IPSC websites (please see page one).

ADEQ's Drinking Water Section will continue to share all information relating to this issue with any interested persons, organizations or regulatory authorities. This report, as well as any updates, will also be posted on the ADEQ web site and will be provided to the EPA.

Currently, national and state level waste programs have regulations governing perchlorates. Although perchlorate is a new issue for both the national and state drinking water programs, stakeholders have already stated that it would be beneficial to include the waste programs, as well as other interested persons, into the information loop on any drinking water studies conducted by the EPA or States. Such a mechanism currently exists in the form of the IPSC. It is a prime example of the EPA's foresight in addressing the need to create a forum which allows for the cooperative exchange of scientific information on perchlorate. The EPA's proactive approach is helping to build a strong partnership, which aids in bringing

together the limited resources of other state environmental regulatory programs and provides up-to-date scientific information on perchlorate to concerned citizens, environmental professionals and state regulatory agencies.

Chemical Summary:

Perchlorate is an oxidizing anion that originates in ground and surface waters from the dissolution of ammonium-, potassium-, magnesium- or sodium perchlorate salts. Perchlorate is exceedingly mobile in aqueous systems and can persist for many decades under typical ground and surface water conditions.

Ammonium perchlorate is manufactured for use as an oxidizer component and primary ingredient in solid propellant for rockets, missiles, and fireworks. Because it is a reducing agent, it can undergo a variety of intramolecular redox reactions that lead to the release of gaseous products, and, thus, it can act as a thrust booster. Perchlorate salts are also used as a component of air bag inflators on a large scale.

Other uses of perchlorate salts include their use in nuclear reactors and electronic tubes, as additives in lubricating oils, in tanning and finishing leather, as a component in fabrics and dyes, in electroplating, in aluminum refining, in rubber manufacture, and in the production of paints and enamels. Chemical fertilizers also have been reported to be a potential source of perchlorate contamination.

Large scale production of perchlorate-containing chemicals in the United States began in the mid 1940's. Because of its short shelf life, perchlorate must be washed out of the United States' missile and rocket inventory regularly and replaced with a fresh supply. Thus, in various states, large volumes have been disposed of since the 1950's.

Perchlorate began to be discovered at various manufacturing sites and in well water throughout the United States. In California, most of the locations where perchlorate has been detected are associated with facilities that have manufactured or tested solid rocket fuels for the Department of Defense (DOD) or National Aeronautics and Space Administration (NASA).

Perchlorate in drinking water is a concern due to existing uncertainties in the toxicological database. Available information inadequately addresses the potential for perchlorate to produce human health effects at low levels. The EPA has published a DRAFT report entitled: Perchlorate Environmental Contamination: Toxicological Review and Risk Characterization Based on Emerging Information; December 31, 1998; NCEA-1-0503.

# Drinking Water Section Fact Sheet #3

## Perchlorate ($ClO_4^-$)

Arizona Department of Environmental Quality
Drinking Water Section
3033 N. Central Avenue, Phoenix, Arizona 85012

Information about ADEQ and the Drinking Water Program can be obtained by calling the Drinking Water Section toll free at **1-800-234-5677 extension 4644**, or by the ADEQ web site which is located at: **www.adeq.state.az.us**

1. Ammonium perchlorate is a man-made inorganic salt that is a strong oxidizer which is used as a component of solid rocket fuel, munitions and in the pyrotechnics fireworks industry. Ammonium perchlorate in fireworks produces the blue colors. Perchlorate continues to be manufactured and used nationwide.

2. Ammonium perchlorate is very soluble and is mobile in groundwater and surface water. The chemical degrades very slowly in the environment.

3. Risk studies will determine whether or if there may be an impact to the environment or human health. Until the scientific studies are completed at the national level, we do not know the effects of low concentrations of perchlorate. Currently it is known that the Las Vegas Wash is transporting perchlorate contamination into Lake Mead which then feeds into the Colorado River.

4. A form of perchlorate has been used in medication for hyperthyroidism (Graves Disease). Potassium perchlorate disrupts the thyroid gland's ability to properly utilize iodine to produce thyroid hormones.

5. Current location information on perchlorate contamination of groundwater and surface water in Arizona is limited since the chemical is not a regulated drinking water contaminant. Testing has been conducted by the EPA along the Colorado River with results ranging from "not-detected" to 9 parts per billion. Other sampling conducted in Arizona along the CAP, in municipalities, Lake Havasu, Jose De Sonita River, Salt River, Verde River, and near some industrial parks ranged from "not-detected" to 6 parts per billion.

6. The Las Vegas area has groundwater contamination ranging from 630,000 parts per billion to 3,700,000 parts per billion. Utah has reported groundwater contamination ranging up to 200 parts per billion.

7. Laboratory methods to test for perchlorate could not get below 400 parts per billion detection level until the first part of 1997. Analysis of water samples conducted in August of 1998 used a modified laboratory method which is able to reach down to 1 part per billion using Ion Chromatography.

8. California currently has an interim health standard of 18 parts per billion. If results are above this level, water systems in California are required to remove that source from the drinking water system or to conduct public notification. California is able to do this since they have the legal authorities within their Department of Health.

9. There are currently no cost effective treatment technologies that can remove perchlorate from the drinking water, groundwater or surface water. Research is ongoing to find a cost-effective treatment technology.

10. Risk studies on perchlorate and its effects on human health are underway, and a revised reference dose is anticipated to be completed by the US EPA by January of 1999. ADEQ is a member of the Interagency Perchlorate Steering Committee (IPSC) which is a national group headed by the US EPA. It is the goal of ADEQ to keep the communities in Arizona up to date on this emerging issue.

Additional information and updates on the issues of perchlorate can be obtained from the **EPA Safe Drinking Water Hotline** located in Washington, D.C. toll free at: **1-800-426-4791.** Updated information can also be obtained on the US EPA Perchlorate website located at **www.epa.gov/ogwdw000/ccl/perchlor/indexkeep.html**

**ADEQ Document number: FS 98-16** M:\wpdocs\dho\guidance.fnl\general \facts.003 September 30, 1998

# Arizona Sample Plan

I. The samples collected in this study was based upon earlier sample sites conducted in a 1998 by EPA Region IX out of San Francisco, California. In early 1999 there was an IPSC forum held in Phoenix, Arizona. Participants included the EPA, National Academy of Science, DOD, state agencies, municipalities, Indian Nations, environmentalists, and other interested persons in the communities of Arizona. After the forum, it was felt both by ADEQ and drinking water stakeholders that Arizona needed a more detailed study of perchlorate levels in drinking water sources before any policies or regulatory actions are drafted in the state of Arizona.

There are two major sets of data points in this report for a total of 112 sample sites. The first set of sample locations primarily focuses on Lake Mead and the Colorado River downstream of Hoover Dam to Yuma. Samples were also collected at wells near the Colorado River, at the CAP intake, several CAP locations and groundwater injection wells utilizing CAP water (See tables 1 & 1a). The second set of sample points was collected by staff from the City of Phoenix municipal water system as part of a supplemental environmental project (SEP) agreement with the EPA and ADEQ. The goal of any SEP is to provide funding to an environmental project that would benefit the surrounding communities. The City of Phoenix sample plan focused on surface water sources and groundwater wells being used for drinking water in the Phoenix metropolitan area (the Valley), which includes several other major municipalities using treated CAP or Salt River Project water sources. This includes all of Phoenix's drinking water treatment plants which treat a number of surface water sources used in the Valley for drinking water purposes. (See tables 2 and 2a).

II. Sample collection for the first set of data points was conducted by William M. Campbell, Groundwater Specialist for the Arizona Small Utilities Association. Whenever a surface water sample was taken, a depth sample was also taken in addition to the surface sampling. A horizontal Van Dorn water sampler was used to collect the depth samples. All locations were recorded using an ADEQ Global Positioning System (GPS) receiver and field test equipment such as temperature and conductivity meters.

Sample collection for the second set of data points was conducted by staff from the City of Phoenix municipal water system. The City of Phoenix also used ADEQ GPS receivers to insure consistency of location documentation. All samples were analyzed by Montgomery Watson laboratories in California using a modified EPA method 300 with a detection level of four parts per billion.

III. ADEQ Sample locations:

- ✔ Lake Mead - South Cove
- ✔ Lake Mead - Las Vegas Bay
- ✔ Lake Mead - Kingman Wash
- ✔ Lake Mohave - Katherines Landing
- ✔ Ft. Mohave Indian Reservation
- ✔ Colorado River at Chemehuevi Indian Reservation
- ✔ Irrigation water at Chemehuevi Indian Reservation
- ✔ Groundwater well at Chemehuevi Indian Reservation
- ✔ Colorado River -Las Angeles, CA water intake
- ✔ Lake Havasu at Havasu Springs
- ✔ Bill Williams River National Wildlife Refuge
- ✔ Big River Well - Colorado River Indian Tribe
- ✔ Colorado River - Colorado River Indian Tribe
- ✔ Colorado River - Cibola National Wildlife Refuge
- ✔ All American Canal - South of Imperial Dam
- ✔ Colorado River - Yuma Proving Ground
- ✔ Groundwater well - North Cocopah Indian Reservation
- ✔ Colorado River - North Cocopah Indian Reservation
- ✔ Groundwater well - Luke Air Force Base
- ✔ ADEQ Building faucet - Phoenix Municipal Water
- ✔ San Pedro River - St. David, AZ
- ✔ Groundwater well - AZ Army National Guard Reservation (Florence, AZ)
- ✔ CAP Canal - State Highway 79
- ✔ CAIDD CAP Blended - Red Rock, AZ
- ✔ Avra Valley Recharge Site - Tucson, AZ
- ✔ Groundwater Well - Camp Navajo, Bellmont, AZ
- ✔ Lake Mary Treatment Plant, Flagstaff, AZ - Raw Water
- ✔ Lake Mary Treatment Plant, Flagstaff, AZ - Finished Water
- ✔ Lake Mary Treatment Plant, Flagstaff, AZ - Groundwater Well
- ✔ Woody Mountain Treatment Plant, Flagstaff, AZ - Raw Water
- ✔ Woody Mountain Treatment Plant, Flagstaff, AZ - Finished Water

IV. Phoenix Metro Valley Sample Locations.

- ✔ Well # 001 - Verde Wells
- ✔ Well # 002 - Verde Wells
- ✔ Well # 003 - Verde Wells
- ✔ Well # 004 - Verde Wells
- ✔ Well # 005 - Verde Wells
- ✔ Well # 007 - Verde Wells
- ✔ Well # 008 - Verde Wells

IV. Phoenix Metro Valley Sample Locations (continued)

- ✔ Well # 009 - Verde Wells / Ft. McDowell Road
- ✔ Well # 010 - Verde Wells / Beeline Highway
- ✔ Well # 011 - Verde Wells
- ✔ Well # 012 - Verde Wells / Beeline Highway
- ✔ Well # 013 - Verde Wells
- ✔ Well # 014 - Verde Wells / Ft. McDowell Road
- ✔ Well # 072 - 5126 North 37th Avenue
- ✔ Point-of-Entry # 072 - 5126 North 37th Avenue
- ✔ Point-of-Entry # 113 - Verde Water Treatment Plant (finished water)
- ✔ Well # 130 - North of Dunlap between 29th Avenue & 35th Avenue
- ✔ Well # 146 - 1621 West Palmer
- ✔ Point of Entry # 146 - 1621 West Palmer
- ✔ Well # 166 - 4138 East Greenway Road
- ✔ Point-of-Entry# 166 - 4138 East Greenway Road
- ✔ Well # 177 - North of Dunlap between 29th Avenue & 35th Avenue
- ✔ Well # 202 - North of Dunlap between 29th Avenue & 35th Avenue
- ✔ Well # 218 - 4375 West Acoma Drive
- ✔ Point-of-Entry #218 - 4375 West Acoma Drive
- ✔ Well # 222 - 16630 South 54th Street
- ✔ Well # 227 - 5226 East Pecos Road
- ✔ Well # 232 - 10831 North 56th Street
- ✔ Point-of-Entry # 232 - 10831 North 56th Street
- ✔ Well # 233 - 10801 North 56th Street
- ✔ Point-of-Entry # 233 - 10801 North 56th Street
- ✔ Well # 234 - 5356 East Double Tree Road
- ✔ Point-of-Entry # 234 - 5356 East Double Tree Road
- ✔ Well # 235 - 6026 East Caballo Drive
- ✔ Point-of-Entry # 235 - 6026 East Caballo Drive
- ✔ Well # 241 - North of Dunlap between 29th Avenue & 35th Avenue
- ✔ Well # 242 - 5330 East Pecos Road
- ✔ Well # 244 - 5602 East Bell Road
- ✔ Point-of-Entry # 244 - 5602 East Bell Road
- ✔ Well # 249 - 18419 North 29th Drive
- ✔ Point-of-Entry # 249 - 18419 North 29th Drive
- ✔ Well # 250 - 16820 North 47th Avenue
- ✔ Point of Entry #250 - 16820 North 47th Avenue
- ✔ Well # 252 - 3308 West Kristal Way
- ✔ Point-of-Entry # 252 - 3308 West Kristal Way
- ✔ Well # 256 - 3615 West Deer Valley Road

IV. Phoenix Metro Valley Sample Locations (continued)

- ✔ Point-of-entry # 256 - 3615 West Deer Valley Road
- ✔ Well # 258 - 24439 North 23rd Avenue
- ✔ Point-of-Entry # 258 - 24439 North 23rd Avenue
- ✔ Well # 261 - 20805 North 56th Street
- ✔ Point-of-Entry # 261 - 20805 North 56th Street
- ✔ Well #262 - 28825 North 28th Avenue
- ✔ Point-of-Entry # 262 - 28825 North 28th Avenue
- ✔ Well # 264 - 6714 East Juniper Avenue
- ✔ Point-of-Entry # 264 - 6714 East Juniper Avenue
- ✔ Well # 275 - 5746 East St. John
- ✔ Point-of-Entry # 275 - 5746 East St. John
- ✔ Well # 276 - 29402 North 44th Street
- ✔ Point-of-Entry # 276 - 29402 North 44th Street
- ✔ Well # 280 - 4390 North Rancho Tierra
- ✔ Point-of-Entry # 280 - 4390 North Rancho Tierra
- ✔ Well # 281 - 33005 North 51st Street
- ✔ Point-of-Entry # 281 - 33005 North 51st Street
- ✔ Well # 284 - 8200 South 56th Avenue
- ✔ Point-of-Entry # 284 - 8200 South 56th Avenue
- ✔ Well # 288 - 28401 North Tatum Blvd.
- ✔ Point-of-Entry # 288 - 28401 North Tatum Blvd.
- ✔ Well # 289 - 28606 North 56th Street
- ✔ Point-of-Entry # 289 - 28606 North 56th Street
- ✔ Well # 290 - 26231 North 32nd Street
- ✔ Point-of-Entry # 290 - 26231 North 32nd Street
- ✔ Well # 291 - 26268 North Tatum Blvd.
- ✔ Point-of-Entry # 291 - 26268 North Tatum Blvd.
- ✔ Well # 292 - 21425 North Tatum Blvd.
- ✔ Point-of-Entry # 292 - 21425 North Tatum Blvd.
- ✔ Point-of-Entry # 777 - 48th Street and Ray Road NW Corner
- ✔ Dear Valley Water Treatment Plant - 3030 West Dunlap
- ✔ Squaw Peak Water Treatment Plant (Raw Canal Water) - 6202 North 24th Street
- ✔ Squaw Peak Water Treatment Plant (Filter Building #6) - 6202 North 24th Street
- ✔ Squaw Peak Water Treatment Plant (J-Box Point of Entry) - 6202 North 24 Street
- ✔ Val Vista Water Treatment Plant (Raw Canal Water) - 3200 East McDowell Road
- ✔ Val Vista Water Treatment Plant (Finished Water Bldg. 12)-3200 East McDowell Rd
- ✔ Union Hills Water Treatment Plant (Raw Canal Water) - 2001 East Deer Valley Road
- ✔ Union Hills Water Treatment Plant (Mod 1) - 2001 East Deer Valley Road
- ✔ Union Hills Water Treatment Plant (Mod 2) - 2001 East Deer Valley Road

IV. Phoenix Metro Valley Sample Locations (continued)

- ✔ Verde Water Treatment Plant (Raw water), Point of Entry # 401
- ✔ Verde Water Treatment Plant (Finished water), Point of Entry # 401
- ✔ Colorado River - Havasu Pump Station
- ✔ Lake Havasu City Well #15
- ✔ Lake Havasu City Well #16
- ✔ Lake Pleasant (at dam discharge)
- ✔ Lake Pleasant Upstream
- ✔ Lake Pleasant Downstream
- ✔ CAP Canal/Power Road
- ✔ Granite Reef Diversion Dam
- ✔ Salt River upstream of Granite Reef Diversion Dam
- ✔ Verde River upstream of Granite Reef Diversion Dam

ADEQ Occurrence Study in Drinking Water Sources
Perchlorate Sampling Sites Phase One (April / May 1999)
Table 1

| Site Number | Zip Code | Perchlorate Level | Sample Locations | Sample Site | GPS Coordinates |
|---|---|---|---|---|---|
| 01 | 86444 | No Detect (<4 ppb) | Lake Mead-South Cove, Meadview, AZ | Lake offshore | 36° 05' 32.081" N<br>114° 06' 20.117" W |
| 02 | 89005 | 160 ppb | Las Vegas Bay, Lake Mead | Las Vegas Bay (Surface) | 36° 07' 48.062" N<br>114° 52' 10.428" W |
| 03 | 89005 | 480 ppb | Las Vegas Bay, Lake Mead | Los Vegas Bay (Bottom) | 36° 07' 48.062" N<br>114° 52' 10.428" W |
| 04 | 86441 | 8.5 ppb | Lake Mead- Kingman Wash, AZ | Kingman Wash Bay (Surface) | 36° 02' 08.062" N<br>114° 42' 28.230 W |
| 05 | 86441 | 8.5 ppb | Lake Mead-Kingman Wash, AZ | Kingman Wash Bay (Bottom) | 36° 02' 08.062" N<br>114° 42' 28.230 W |
| 06 | 86401 | 6.5 ppb | Lake Mohave - Katherines Landing, AZ | Bay Surface | 35° 12' 55.307" N<br>114° 34' 22.486 W |
| 07 | 86401 | 6.3 ppb | Lake Mohave-Katherines Landing, AZ | Bay Bottom | 35° 12' 55.307" N<br>114° 34' 22.486 W |
| 08 | 92363 | No Detect (<4 ppb) | Ft. Mohave Indian Reservation | Mohave Beach residence | 34° 55' 07.217" N<br>114° 37' 49.293 W |
| 09 | 92363 | No Detect (<4 ppb) | Ft. Mohave Indian Reservation | Needles Well, Tribal HQ | 34° 51' 08.685" N<br>114° 36' 55.346" W |
| 10 | 92363 | No Detect (<4 ppb) | Ft. Mohave Indian Reservation | Tribal Water Office | 34° 54' 37.862" N<br>114° 35' 46.710" W |
| 11 | 92363 | No Detect (<4 ppb) | Ft. Mohave Indian Reservation | Casino Avi Tap | 35° 00' 56.652" N<br>114° 38' 29.977" W |

ppb = parts per billion = $\mu$g/l = micrograms per liter

ADEQ Occurrence Study in Drinking Water Sources
Perchlorate Sampling Sites Phase One (April / May 1999)
Table 1

| Site Number | Zip Code | Perchlorate Level | Sample Locations | Sample Site | GPS Coordinates |
|---|---|---|---|---|---|
| 12 | 92363 | 5.4 ppb | Chemehuevi Indian Reservation, CA | Colorado River Channel Surface | 34° 32' 53.151" N 114° 23' 39.472" W |
| 13 | 92363 | 6.1 ppb | Chemehuevi Indian Reservation, CA | Colorado River Channel Bottom | 34° 32' 53.151" N 114° 23' 39.472" W |
| 14 | 92363 | 5.7 ppb | Chemehuevi Indian Reservation, CA | Irrigation Water | 34° 31' 17.576" N 114° 23' 40.995" W |
| 15 | 92363 | No Detect (<4 ppb) | Chemehuevi Indian Reservation, CA | Havasu Palms well | 34° 24' 02.381" N 114° 16' 37.453" W |
| 16 | 92363 | 5.9 ppb | Los Angeles Water Intake, Lake Havasu | Lake Havasu before intake | 34° 19' 00.841" N 114° 09' 24.140" W |
| 17 | 85344 | 5.6 ppb | Lake Havasu-Havasu Springs, AZ | Shoreline near CAP intake | 34° 17' 35.507" N 114° 06' 11.972" W |
| 18 | 86403 | No Detect (<4 ppb) | Bill Williams River National Wildlife Refuge, AZ | River east of Colorado River Confluence | 34° 17' 55.930" N 114° 05' 16.076" W |
| 19 | 92242 | No Detect (<4 ppb) | Colorado River Indian Tribe Reservation, AZ | Big River Well | 34° 07' 14.167" N 114° 22' 40.131" W |
| 20 | 85344 | 6.2 ppb | Colorado River Indian Tribe Reservation, AZ | Main Irrigation Canal at Mohave Road | 34° 00' 47.668" N 114° 23' 21.863" W |
| 21 | 85344 | 6.4 ppb | Colorado River Indian Tribe Reservation, AZ | Colorado River midstream, Agnes Wilson Bridge | 34° 02' 32.992" N 114° 26' 03.783" W |

ppb = parts per billion = $\mu$g/l = micrograms per liter

ADEQ Occurrence Study in Drinking Water Sources
Perchlorate Sampling Sites Phase One (April / May 1999)
Table 1

| Site Number | Zip Code | Perchlorate Level | Sample Locations | Sample Site | GPS Coordinates |
|---|---|---|---|---|---|
| 22 | 85356 | 5.4 ppb | Cibola National Wildlife Refuge, Cibola AZ | Colorado River Shoreline | 33° 18' 10.391" N<br>114° 40' 36.651" W |
| 23 | 92283 | 5.1 ppb | South of Imperial Dam | All American Canal | 32° 52' 22.175" N<br>114° 28' 42.188" W |
| 24 | 85365 | 5.0 ppb | Yuma Proving Grounds | Colorado River Shoreline | 32° 51' 01.692" N<br>114° 26' 34.132" W |
| 25 | 85350 | No Detect (<4 ppb) | North Cocopah Indian Reservation, AZ | RV Park Groundwater Well | 32° 44' 18.553" N<br>114° 41' 31.768" W |
| 26 | 85350 | No Detect (<4 ppb) | North Cocopah Indian Reservation, AZ | Colorado River shoreline | 32° 44' 23.745" N<br>114° 41' 31.825" W |
| 27 | 85340 | No Detect (<4 ppb) | Luke Air Force Base, AZ | Groundwater Well | 33° 32' 20.306" N<br>112° 21' 50.469" W |
| 28 | 85338 | Not able to collect | Phoenix /Goodyear Airport<br>(Not sampled) | Monitoring Well<br>(Not sampled). | Request to enter site and sample denied. |
| 29 | 85012 | No Detect (<4 ppb) | Phoenix Municipal Water tap sample<br>3033 North Central Avenue (ADEQ) | 2nd Floor Mens Bathroom faucet | 33° 29' 00.14" N<br>112° 04' 20.02" W |
| 30 | 85630 | No Detect (<4 ppb) | St. David, AZ | San Pedro River | 31° 54' 19.618" N<br>110° 14' 44.984" W |
| 31 | 85232 | No Detect (<4 ppb) | Arizona Army National Guard Reservations, Florence, AZ | San Pedro River | 32° 52' 22.175" N<br>114° 28' 42.188" W |

ppb = parts per billion = $\mu$g/l = micrograms per liter

ADEQ Occurrence Study in Drinking Water Sources
Perchlorate Sampling Sites Phase One (April / May 1999)
Table 1

| Site Number | Zip Code | Perchlorate Level | Sample Locations | Sample Site | GPS Coordinates |
|---|---|---|---|---|---|
| 32 | 85232 | No Detect (<4 ppb) | State Highway 79 CAP crossing; Florence, AZ | Over bridge railing, downstream | 33° 04' 42.669" N<br>111° 22' 24.186" W |
| 33 | 85231 | No Detect (<4 ppb) | Red Rock, AZ | CAIDD CAP inlet | 32° 35' 18.057" N<br>111° 24' 50.525" W |
| 34 | 85742 | No Detect (<4 ppb) | Avra Valley Recharge Site, Tucson, AZ | CAP Recharge Water | 32° 24' 53.605" N<br>111° 12' 49.164" W |
| 35 | 86001 | No Detect (<4 ppb) | Camp Navajo, Bellmont, AZ | Groundwater Well | 35° 13' 08.938" N<br>111° 50' 01.426" W |
| 36 | 86001 | No Detect (<4 ppb) | Flagstaff, Lake Mary Treatment Plant | Drinking Water Treatment Plant - Raw Water | 35° 09' 00.382" N<br>111° 39' 02.517" W |
| 37 | 86001 | No Detect (<4 ppb) | Flagstaff, Lake Mary Treatment Plant | Drinking Water Treatment Plant - Finished Water | 35° 09' 05.393" N<br>111° 39' 04.917" W |
| 38 | 86001 | No Detect (<4 ppb) | Flagstaff, Lake Mary Treatment Plant | Drinking Water Treatment Plant - Groundwater Well | 35° 06' 32.707" N<br>111° 35' 08.116" W |
| 39 | 86001 | No Detect (<4 ppb) | Flagstaff, Woody Mountain Treatment Plant | Drinking Water Treatment Plant - Raw Water | 35° 09' 32.988" N<br>111° 42' 54.387" W |
| 40 | 86001 | No Detect (<4 ppb) | Flagstaff, Woody Mountain Treatment Plant | Drinking Water Treatment Plant - Finished Water | 35° 09' 35.246" N<br>111° 42' 28.088" W |

ppb = parts per billion = $\mu$g/l = micrograms per liter

ADEQ Occurrence Study in Drinking Water Sources
Perchlorate Sampling Sites Phase One (April / May 1999)
Table 1a

| Site Number | Zip Code | Sample Location (General Location Description) | Sample Date | Sample Time (24 hr) | Air Temp (Celsius) | Sample Depth (Meters) | Water Temp (Celsius) | Conductivity ($\mu$siemens/cm) |
|---|---|---|---|---|---|---|---|---|
| 01 | 86444 | Lake Mead-South Cove, Meadview, AZ | April 14, 1999 | 18:30 | 28.9 | 15.6 | 16.3 | 770 |
| 02 | 89005 | Las Vegas Bay, Lake Mead | April 15, 1999 | 14:20 | 27.8 | 0.3 | 15.2 | 1156 |
| 03 | 89005 | Las Vegas Bay, Lake Mead | April 15, 1999 | 14:30 | 27.8 | 8.5 | 15.4 | 1155 |
| 04 | 86441 | Lake Mead, Kingman Wash, AZ | April 15, 1999 | 11:45 | 28.9 | 0.3 | 13.1 | 1145 |
| 05 | 86441 | Lake Mead, Kingman Wash, AZ | April 15, 1999 | 11:30 | 28.9 | 24.4 | 12.3 | 1147 |
| 06 | 86401 | Lake Mohave, Katherines Landing, AZ | April 16, 1999 | 11:10 | 21.1 | 0.3 | 15.2 | 835 |
| 07 | 86401 | Lake Mohave, Katherines Landing, AZ | April 16 1999 | 11:15 | 21.1 | 18.3 | 16.0 | 830 |
| 08 | 92363 | Ft. Mohave Indian Reservation Mohave Beach Residence | April 16, 1999 | 15:15 | ** | Groundwater Well | 19.4 | 1145 |
| 09 | 92363 | Ft. Mohave Indian Reservation Needles Well, Tribal HQ | April 16, 1999 | 16:00 | ** | Groundwater Well | 19.9 | 1222 |
| 10 | 92363 | Ft. Mohave Indian Reservation Tribal Water Office | April 16, 1999 | 14:30 | ** | Groundwater Well | 25.1 | 2280 |

** = No data available or No data collected for this data field.



1 meter = 39.97inches

ADEQ Occurrence Study in Drinking Water Sources
Perchlorate Sampling Sites Phase One (April / May 1999)
Table 1a

| Site Number | Zip Code | Sample Location (General Location Description) | Sample Date | Sample Time (24 hr) | Air Temp (Celsius) | Sample Depth (Meters) | Water Temp (Celsius) | Conductivity ($\mu$siemens/cm) |
|---|---|---|---|---|---|---|---|---|
| 11 | 92363 | Ft. Mohave Indian Reservation Casino Avi Tap | April 16, 1999 | 21:00 | ** | Groundwater Well | 19.5 | 1283 |
| 12 | 92363 | Chemehuevi Indian Reservation, CA | April 17, 1999 | 13:20 | 29.4 | 0.3 | 14.3 | 887 |
| 13 | 92363 | Chemehuevi Indian Reservation, CA, Colorado River Bottom | April 17, 1999 | 13:15 | 29.4 | 5.5 | 14.8 | 892 |
| 14 | 92363 | Chemehuevi Indian Reservation, CA, Irrigation Water | April 17, 1999 | 14:15 | 29.4 | Surface | 31.0 | 1032 |
| 15 | 92363 | Chemehuevi Indian Reservation, CA, Havasu Palms well | April 18, 1999 | 11.15 | 29.4 | Groundwater Well | 20.3 | 973 |
| 16 | 92363 | Los Angeles Water Intake, Lake Havasu | April 18, 1999 | 12:45 | 28.9 | 6.1 | 16.4 | 1010 |
| 17 | 85344 | Lake Havasu, Havasu Springs, AZ | April 18, 1999 | 14:30 | 33.9 | 3.1 | 15.8 | 1010 |
| 18 | 86403 | Bill Williams River National Wildlife Refuge, AZ | April 18, 1999 | 13:40 | 33.9 | 3.1 | 16.5 | 1108 |

** = No data available or No data collected for this data field.



1 meter = 39.97inches

ADEQ Occurrence Study in Drinking Water Sources
Perchlorate Sampling Sites Phase One (April / May 1999)
Table 1a

| Site Number | Zip Code | Sample Location (General Location Description) | Sample Date | Sample Time (24 hr) | Air Temp (Celsius) | Sample Depth (Meters) | Water Temp (Celsius) | Conductivity ($\mu$siemens/cm) |
|---|---|---|---|---|---|---|---|---|
| 19 | 92242 | Colorado River Indian Tribe Reservation, AZ, Big River Well | April 19, 1999 | 14:30 | 40.0 | Groundwater Well | 17.8 | 1878 |
| 20 | 85344 | Colorado River Indian Tribe Reservation, AZ, Main Irrigation Canal at Mohave Road | April 19, 1999 | 11:00 | ** | 0.3 | 18.7 | 810 |
| 21 | 85344 | Colorado River Indian Tribe Reservation, AZ, Agnes Wilson Bridge | April 19, 1999 | 12:00 | ** | 0.3 | 16.2 | 918 |
| 22 | 85356 | Cibola National Wildlife Refuge, AZ, Colorado River Shoreline | April 20, 1999 | 12:45 | 37.2 | 0.3 | 19.5 | 1127 |
| 23 | 92283 | South of Imperial Dam, CA | April 21, 1999 | 11:15 | 23.9 | 0.3 | 20.2 | 1158 |
| 24 | 85365 | Yuma Proving Ground, River Shoreline | April 21, 1999 | 12:30 | ** | 0.3 | 21.3 | 1715 |
| 25 | 85350 | North Cocopah Indian Reservation, RV Park | April 21, 1999 | 05:45 | ** | Groundwater Well | 25.7 | 1674 |
| 26 | 85350 | North Cocopah Indian Reservation, Colorado River Shoreline | April 21, 1999 | 07:00 | ** | 0.3 | 21.3 | 1715 |

** = No data available or No data collected for this data field.



1 meter = 39.97inches

ADEQ Occurrence Study in Drinking Water Sources
Perchlorate Sampling Sites Phase One (April / May 1999)
Table 1a

| Site Number | Zip Code | Sample Location (General Location Description) | Sample Date | Sample Time (24 hr) | Air Temp (Celsius) | Sample Depth (Meters) | Water Temp (Celsius) | Conductivity ($\mu$siemens/cm) |
|---|---|---|---|---|---|---|---|---|
| 27 | 85340 | Luke Air Force Base, AZ | May 26, 1999 | ** | 31.0 | Groundwater Well | 26.5 | 289 |
| 28 | 85338 | Phoenix Goodyear Airport | Not Sampled | | | | | |
| 29 | 85012 | Phoenix Municipal Water, 2nd floor bathroom, ADEQ, 3033 N. Central Ave., Phoenix, AZ | May 27, 1999 | ** | Indoor sample site | Water Fountain | 22.8 | 618 |
| 30 | 85630 | St. David, AZ; San Pedro River | May 22, 1999 | ** | 35.0 | ** | 24.1 | 339 |
| 31 | 85232 | Arizona Army National Guard Reservation, Florence AZ | May 13, 1999 | ** | 36.7 | Groundwater Well | 23.6 | 1180 |
| 32 | 85232 | State Highway 79 CAP Crossing, Florence, AZ. Downstream over bridge railing | May 13, 1999 | ** | 36.7 | ** | 22.2 | 1043 |
| 33 | 85231 | Red Rock, AZ. CAIDD CAP inlet | May 13, 1999 | ** | 36.7 | ** | 24.6 | 1004 |
| 34 | 85742 | Avra Valley Recharge Site (Tucson, AZ) | May 13, 1999 | ** | 35.0 | ** | 23.0 | 677 |

** = No data available or No data collected for this data field.



1 meter = 39.97inches

ADEQ Occurrence Study in Drinking Water Sources
Perchlorate Sampling Sites Phase One (April / May 1999)
Table 1a

| Site Number | Zip Code | Sample Location (General Location Description) | Sample Date | Sample Time (24 hr) | Air Temp (Celsius) | Sample Depth (Meters) | Water Temp (Celsius) | Conductivity ($\mu$siemens/cm) |
|---|---|---|---|---|---|---|---|---|
| 35 | 86001 | Camp Navajo, Bellmont, AZ, Groundwater Well | May 18, 1999 | ** | 29.4 | ** | 14.5 | 361 |
| 36 | 86001 | Flagstaff, Lake Mary Treatment Plant - Raw Water | Sept 13, 1999 | 11:15 | 21.0 | ** | 17.6 | 38 |
| 37 | 86001 | Flagstaff, Lake Mary Treatment Plant - Finished Water | Sept 13, 1999 | 11:15 | 21.0 | ** | 14.3 | 185 |
| 38 | 86001 | Flagstaff, Lake Mary Treatment Plant - Groundwater Well | Sept 13, 1999 | 11:15 | 29.0 | ** | 11.1 | 283 |
| 39 | 86001 | Flagstaff, Woody Mountain Treatment Plant - Raw Water | Sept 13, 1999 | 11:15 | 30.0 | ** | 11.2 | 125 |
| 40 | 86001 | Flagstaff, Woody Mountain Treatment Plant - Finished Water | Sept 13, 1999 | 11:15 | 30.0 | ** | 13.1 | 120 |

** = No data available or No data collected for this data field.



1 meter = 39.97inches

ADEQ Perchlorate Occurrence Study in Drinking Water Sources
Phoenix Municipal Water Sampling Sites
Table 2

| Site Number | Zip Code | Perchlorate Level | Sample Locations | Sample Site | GPS Coordinates |
|---|---|---|---|---|---|
| 41 | 85264 | Not Sampled | Verde Wells | Well # 001 | 33° 36' 39.130" N<br>111° 40' 44.842" W |
| 42 | 85264 | Not Sampled | Verde Wells | Well # 002 | 33° 36' 42.483" N<br>111° 40' 43.338" W |
| 43 | 85264 | Not Sampled | Verde Wells | Well # 003 | 33° 36' 45.829" N<br>111° 40' 40.995" W |
| 44 | 85264 | Not Sampled | Verde Wells | Well # 004 | 33° 36' 50.475" N<br>111° 40' 39.188" W |
| 45 | 85264 | Not Sampled | Verde Wells | Well # 005 | 33° 36' 57.924" N<br>111° 40' 31.524" W |
| 46 | 85264 | Not Sampled | Verde Wells | Well # 007 | 33° 35' 45.972" N<br>111° 40' 26.369" W |
| 47 | 85264 | Not Sampled | Verde Wells | Well # 008 | 33° 35' 00.549" N<br>111° 40' 27.284" W |
| 48 | 85264 | Not Sampled | Verde Wells & Ft. McDowell Road | Well # 009 | 33° 34' 54.184" N<br>111° 40' 32.702" W |
| 49 | 85264 | Not Sampled | Verde Wells & Beeline Hwy. | Well # 010 | 33° 34' 53.424" N<br>111° 40' 23.442" W |
| 50 | 85264 | Not Sampled | Verde Wells & Beeline Hwy. | Well # 011 | 33° 34' 52.338" N<br>111° 40' 17.629" W |

ppb = parts per billion = $\mu$g/l = micrograms per liter

ADEQ Perchlorate Occurrence Study in Drinking Water Sources
Phoenix Municipal Water Sampling Sites
Table 2

| Site Number | Zip Code | Perchlorate Level | Sample Locations | Sample Site | GPS Coordinates |
|---|---|---|---|---|---|
| 51 | 85264 | Not Sampled | Verde Wells & Beeline Hwy. | Well # 012 | 33° 34' 46.927" N<br>111° 40' 28.799" W |
| 52 | 85264 | Not Sampled | Verde Wells | Well # 013 | 33° 35' 02.449" N<br>111° 40' 15.583" W |
| 53 | 85264 | Not Sampled | Verde Wells & Ft. McDowell Road | Well # 014 | 33° 36' 20.633" N<br>111° 40' 43.887" W |
| 54 | 85017 | Not Sampled | 5126 North 37th Avenue | Well # 072 | 33° 30' 45.922" N<br>112° 08' 20.061" W |
| 54A | 85017 | No Detect (<4 ppb) | 5126 North 37th Avenue | Point of Entry # 072 | 33° 30' 46.030" N<br>112° 08' 19.117" W |
| 55 | 85264 | No Detect (<4 ppb) | Verde Treatment Plant (Storage Tank) | Point of Entry # 113 | 33° 32' 49.902" N<br>112° 39' 58.402" W |
| 56 | 85021 | Not Sampled | Dear Valley Treatment Plant | Point of Entry # 130 | 33° 34' 11.663" N<br>112° 07' 27.658" W |
| 57 | 85021 | Not Sampled | 1621 West Palmer | Well # 146 | 33° 34' 17.464" N<br>112° 05' 37.463" W |
| 57A | 85021 | No Detect (<4 ppb) | 1621 West Palmer | Point of Entry # 146 | 33° 34' 17.791" N<br>112° 05' 37.049" W |
| 58 | 85032 | Out of Service | 4138 East Greenway Road | Well # 166 | 33° 37' 37.251" N<br>111° 59' 24.966" W |

ppb = parts per billion = $\mu$g/l = micrograms per liter

# ADEQ Perchlorate Occurrence Study in Drinking Water Sources
## Phoenix Municipal Water Sampling Sites
## Table 2

| Site Number | Zip Code | Perchlorate Level | Sample Locations | Sample Site | GPS Coordinates |
|---|---|---|---|---|---|
| 58A | 85032 | Out of Service | 4138 East Greenway Road | Point of Entry # 166 | 33° 37' 37.801" N<br>111° 59' 25.873" W |
| 59 | 85051 | Not Sampled | 3030 West Dunlap | Well # 177 | 33° 34' 11.653" N<br>112° 07' 12.823" W |
| 60 | 85051 | Not Sampled | 3030 West Dunlap | Well # 202 | 33° 34' 12.945" N<br>112° 07' 46.515" W |
| 61 | 85306 | Out of Service | 4375 West Acoma Drive | Well # 218 | 33° 37' 01.399" N<br>112° 09' 08.313" W |
| 61A | 85306 | Out of Service | 4375 West Acoma Drive | Point of Entry # 218 | 33° 37' 01.608" N<br>112° 09' 08.524" W |
| 62 | 85226 | Not Sampled | 16630 South 54th Street | Well # 222 | 33° 17' 36.115" N<br>111° 58' 05.115" W |
| 63 | 85226 | Not Sampled | 5226 East Pecos Road | Well # 227 | 33° 17' 27.354" N<br>111° 58' 12.970" W |
| 64 | 85254 | Not Sampled | 10831 North 56th Street | Well # 232 | 33° 35' 08.127" N<br>111° 57' 34.236" W |
| 64A | 85254 | No Detect (<4 ppb) | 10831 North 56th Street | Point of Entry # 232 | 33° 35' 08.189" N<br>111° 57' 34.747" W |
| 65 | 85254 | Not Sampled | 10801 North 56th Street | Well # 233 | 33° 35' 04.467" N<br>111° 57' 33.656" W |

ppb = parts per billion = $\mu$g/l = micrograms per liter

ADEQ Perchlorate Occurrence Study in Drinking Water Sources
Phoenix Municipal Water Sampling Sites
Table 2

| Site Number | Zip Code | Perchlorate Level | Sample Locations | Sample Site | GPS Coordinates |
|---|---|---|---|---|---|
| 65A | 85254 | No Detect (<4 ppb) | 10801 North 56th Street | Point of Entry # 233 | 33° 35' 04.467" N<br>111° 57' 33.656" W |
| 66 | 85253 | Out of Service | 5356 East Double Tree Road | Well # 234 | 33° 34' 08.542" N<br>111° 57' 51.336" W |
| 66A | 85253 | Out of Service | 5356 East Double Tree Road | Point of Entry # 234 | 33° 34' 08.542" N<br>111° 57' 51.336" W |
| 67 | 85253 | Not Sampled | 6026 East Caballo Drive | Well # 235 | 33° 33' 44.970" N<br>111° 57' 00.877" W |
| 67A | 85253 | No Detect (<4 ppb) | 6026 East Caballo Drive | Point of Entry # 235 | 33° 33' 44.915" N<br>111° 57' 01.960" W |
| 68 | 85051 | Not Sampled | 3030 West Dunlap | Well # 241 | 33° 34' 17.380" N<br>112° 07' 58.239" W |
| 69 | 85226 | Not Sampled | 5280 East Pecos Road | Well # 242 | 33° 17' 27.638" N<br>111° 58' 05.743" W |
| 70 | 85254 | Not Sampled | 5602 East Bell Road | Well # 244 | 33° 38' 26.422" N<br>111° 57' 32.647" W |
| 70A | 85254 | No Detect (<4 ppb) | 5602 East Bell Road | Point of Entry # 244 | 33° 38' 26.422" N<br>111° 57' 32.647" W |
| 71 | 85053 | Out of Service | 18419 North 29th Drive | Well # 249 | 33° 39' 12.497" N<br>112° 07' 15.240" W |

ppb = parts per billion = $\mu$g/l = micrograms per liter

ADEQ Perchlorate Occurrence Study in Drinking Water Sources
Phoenix Municipal Water Sampling Sites
Table 2

| Site Number | Zip Code | Perchlorate Level | Sample Locations | Sample Site | GPS Coordinates |
|---|---|---|---|---|---|
| 71A | 85053 | Out of Service | 18419 North 28th Drive | Point of Entry # 249 | 33° 39' 12.236" N<br>112° 07' 15.402" W |
| 72 | 85306 | Not Sampled | 16820 North 47th Avenue | Well # 250 | 33° 38' 19.687" N<br>112° 09' 35.774" W |
| 72A | 85306 | No Detect (<4 ppb) | 16820 North 47th Avenue | Point of Entry # 250 | 33° 38' 19.308" N<br>112° 09' 35.968" W |
| 73 | 85027 | Not Sampled | 3308 West Kristal Way | Well # 252 | 33° 39' 42.775" N<br>112° 07' 51.309" W |
| 73A | 85027 | No Detect (<4 ppb) | 3308 West Kristal Way | Point of Entry # 252 | 33° 39' 42.775" N<br>112° 07' 51.309" W |
| 74 | 85308 | Not Sampled | 3615 West Deer Valley Road | Well # 256 | 33° 40' 59.994" N<br>112° 08' 15.596" W |
| 74A | 85308 | No Detect (<4 ppb) | 3615 West Deer Valley Road | Point of Entry # 256 | 33° 41' 00.877" N<br>112° 08' 15.850" W |
| 75 | 85310 | Not Sampled | 24439 North 23rd Avenue | Well # 258 | 33° 42' 30.753" N<br>112° 06' 26.253" W |
| 75A | 85310 | Not Sampled | 24439 North 23rd Avenue | Point of Entry # 258 | 33° 42' 30.753" N<br>112° 06' 26.253" W |
| 76 | 85054 | Not Sampled | 20805 North 56th Street | Well # 261 | 33° 40' 32.843" N<br>111° 57' 19.181" W |

ppb = parts per billion = $\mu$g/l = micrograms per liter

# ADEQ Perchlorate Occurrence Study in Drinking Water Sources
## Phoenix Municipal Water Sampling Sites
## Table 2

| Site Number | Zip Code | Perchlorate Level | Sample Locations | Sample Site | GPS Coordinates |
|---|---|---|---|---|---|
| 76A | 85054 | No Detect (<4 ppb) | 20805 North 56th Street | Point of Entry # 261 | 33° 40' 32.843" N<br>111° 57' 19.181" W |
| 77 | 85310 | Not Sampled | 28825 North 28th Avenue | Well # 262 | 33° 43' 39.233" N<br>112° 07' 07.251" W |
| 77A | 85310 | Not Sampled | 28825 North 28th Avenue | Point of Entry # 262 | 33° 43' 39.083" N<br>112° 07' 07.503" W |
| 78 | 85254 | Out of Service | 6714 East Juniper Avenue | Well # 264 | 33° 38' 23.648" N<br>111° 56' 05.379" W |
| 78A | 85254 | Out of Service | 6715 East Juniper Avenue | Point of Entry # 264 | 33° 38' 23.832" N<br>111° 56' 05.119" W |
| 79 | 85054 | Not Sampled | 5746 East St Johns | Well # 275 | 33° 38' 51.341" N<br>111° 57' 18.563" W |
| 79A | 85054 | No Detect (<4 ppb) | 5746 East St. Johns | Point of Entry # 275 | 33° 38' 51.101" N<br>111° 57' 18.598" W |
| 80 | 85331 | Not Sampled | 29402 North 44th Street | Well # 276 | 33° 45' 07.818" N<br>111° 59' 12.546" W |
| 80A | 85331 | No Detect (<4 ppb) | 29402 North 44th Street | Point of Entry # 276 | 33° 45' 08.318" N<br>111° 59' 12.828" W |
| 81 | 85331 | Not Sampled | 4390 North Rancho Tierra | Well # 280 | 33° 45' 56.859" N<br>111° 56' 05.029" W |

ppb = parts per billion = $\mu$g/l = micrograms per liter

ADEQ Perchlorate Occurrence Study in Drinking Water Sources
Phoenix Municipal Water Sampling Sites
Table 2

| Site Number | Zip Code | Perchlorate Level | Sample Locations | Sample Site | GPS Coordinates |
|---|---|---|---|---|---|
| 81A | 85331 | No Detect (<4 ppb) | 4390 North Rancho Tierra | Point of Entry # 280 | 33° 45' 56.425" N<br>111° 59' 05.654" W |
| 82 | 85331 | Not Sampled | 33005 North 51st Street | Well # 281 | 33° 47' 10.282" N<br>111° 58' 06.083" W |
| 82A | 85331 | No Detect (<4 ppb) | 33005 North 51st Street | Point of Entry # 281 | 33° 47' 10.711" N<br>111° 58' 04.575" W |
| 83 | 85339 | Not Sampled | 8200 South 56th Avenue | Well # 284 | 33° 22' 18.424" N<br>111° 10' 46.040" W |
| 83A | 85339 | No Detect (<4 ppb) | 8200 South 56th Avenue | Point of Entry # 284 | 33° 22' 18.320" N<br>112° 10' 46.409" W |
| 84 | 85331 | Not Sampled | 28401 North Tatum Blvd. | Well # 288 | 33° 44' 34.722" N<br>111° 58' 32.112" W |
| 84A | 85331 | No Detect (<4 ppb) | 28401 North Tatum Blvd. | Point of Entry # 288 | 33° 44' 34.398" N<br>111° 58' 32.835" W |
| 85 | 85331 | Not Sampled | 28606 North 56th Street | Well # 289 | 33° 44' 41.611" N<br>111° 57' 36.939" W |
| 85A | 85331 | No Detect (<4 ppb) | 28606 North 56th Street | Point of Entry # 289 | 33° 44' 41.611" N<br>111° 57' 36.939" W |
| 86 | 85024 | Not Sampled | 26231 North 32nd Street | Well # 290 | 33° 43' 33.981" N<br>111° 59' 42.847" W |

ppb = parts per billion = $\mu$g/l = micrograms per liter

ADEQ Perchlorate Occurrence Study in Drinking Water Sources
Phoenix Municipal Water Sampling Sites
Table 2

| Site Number | Zip Code | Perchlorate Level | Sample Locations | Sample Site | GPS Coordinates |
|---|---|---|---|---|---|
| 86A | 85024 | No Detect (<4 ppb) | 26231 North 32nd Street | Point of Entry # 290 | 33° 43' 32.333" N<br>111° 59' 42.611" W |
| 87 | 85024 | Not Sampled | 26268 North Tatum Blvd. | Well # 291 | 33° 43' 28.035" N<br>111° 58' 39.652" W |
| 87A | 85024 | No Detect (<4 ppb) | 26268 North Tatum Blvd. | Point of Entry # 291 | 33° 43' 27.741" N<br>111° 58' 39.509" W |
| 88 | 85050 | Not Sampled | 21425 North Tatum Blvd. | Well # 292 | 33° 40' 51.599" N<br>111° 58' 36.704" W |
| 88A | 85050 | No Detect (<4 ppb) | 21425 North Tatum Blvd. | Point of Entry # 292 | 33° 40' 51.699" N<br>111° 58' 37.082" W |
| 89 | 85044 | No Detect (<4 ppb) | 48th Street and Ray Road N/W corner | Point of Entry # 777 | 33° 19' 13.019" N<br>111° 58' 48.019" W |
| 90 | 85051 | Not Sampled | 3030 West Dunlap | Dear Valley Treatment Plant (Headworks) | 33° 34' 11.878" N<br>112° 07' 26.487" W |
| 91 | 85051 | No Detect (<4 ppb) | 3030 West Dunlap | Dear Valley Treatment Plant (Finished Water) | 33° 34' 04.592" N<br>112° 07' 35.288" W |
| 92 | 85051 | No Detect (<4 ppb) | 3030 West Dunlap | Dear Valley Treatment Plant (Reservoir Inlet Bldg) | 33° 34' 05.368" N<br>112° 07' 39.068" W |

ppb = parts per billion = $\mu$g/l = micrograms per liter

# ADEQ Perchlorate Occurrence Study in Drinking Water Sources
## Phoenix Municipal Water Sampling Sites
## Table 2

| Site Number | Zip Code | Perchlorate Level | Sample Locations | Sample Site | GPS Coordinates |
|---|---|---|---|---|---|
| 93 | 85016 | No Detect (<4 ppb) | 6202 North 24th Street | Squaw Peak Treatment Plant (Raw Water) | 33° 31' 34.758" N<br>112° 01' 55.531" W |
| 94 | 85016 | Not Sampled | 6202 North 24th Street | Squaw Peak Treatment Plant (Filter Bldg # 6) | 33° 31' 53.331" N<br>112° 01' 57.122" W |
| 95 | 85016 | No Detect (<4 ppb) | 6202 North 24th Street | Squaw Peak Treatment Plant (J-Box Point of Entry) | 33° 31' 44.881" N<br>112° 01' 53.291" W |
| 96 | 85213 | No Detect (<4 ppb) | 3200 East McDowell Road | Val Vista Treatment Plant (Raw Water) | 33° 28' 19.702" N<br>111° 45' 36.049" W |
| 97 | 85213 | No Detect (<4 ppb) | 3200 East McDowell Road | Val Vista Treatment Plant (Finished Water) | 33° 27' 59.946" N<br>111° 46' 10.989" W |
| 98 | 85027 | No Detect (<4 ppb) | 2001 East Deer Valley Road | Union Hills Treatment Plant (Raw Water) | 33° 41' 12.652" N<br>112° 02' 11.413" W |
| 99 | 85027 | No Detect (<4 ppb) | 2001 East Deer Valley Road | Union Hills Treatment Plant (Finished Water, MOD 1) | 33° 40' 56.920" N<br>112° 02' 10.009" W |
| 100 | 85027 | No Detect (<4 ppb) | 2001 East Deer Valley Road | Union Hills Treatment Plant (Finished Water, MOD 2) | 33° 40' 59.582" N<br>112° 02' 12.046" W |

ppb = parts per billion = $\mu$g/l = micrograms per liter

ADEQ Perchlorate Occurrence Study in Drinking Water Sources
Phoenix Municipal Water Sampling Sites
Table 2

| Site Number | Zip Code | Perchlorate Level | Sample Locations | Sample Site | GPS Coordinates |
|---|---|---|---|---|---|
| 101 | 85264 | Out of Service | Out of Service | Verde Treatment Plant (Raw Water) | 33° 32' 41.957" N<br>111° 40' 04.841" W |
| 102 | 85264 | Out of Service | Out of Service | Verde Treatment Plant (Finished Water) | 33° 32' 50.066" N<br>111° 39' 59.523" W |
| 103 | 85344 | 7.3 ppb | Colorado River | Havasu Pump Station | 34° 07' 19.4" N<br>114° 66' 11.4" W |
| 104 | 86404 | No Detect (<4 ppb) | Well near Colorado River | Lake Havasu City Well #15 | 34° 30' 20" N<br>114° 21' 34" W |
| 105 | 86404 | No Detect (<4 ppb) | Well near Colorado River | Lake Havasu City Well #16 | 34° 27' 53" N<br>114° 20' 15" W |
| 106 | 85382 | No Detect (<4 ppb) | Lake Pleasant | Towers (at Dam discharge) | 33° 50' 41" N<br>112° 16' 17" W |
| 107 | 85382 | 6.7 ppb | Lake Pleasant Upstream | ½ mile West of 99th Avenue | 33° 46' 53.6" N<br>112° 17' 10.2" W |
| 108 | 85382 | 4.5 ppb | Lake Pleasant Downstream | 99th Avenue and CAP Canal | 33° 46' 46" N<br>112° 14' 48" W |
| 109 | 85215 | 5.6 ppb | CAP Canal/Power Road | McKellips Bridge | 33° 27' 05" N<br>111° 40' 17" W |

ppb = parts per billion = $\mu$g/l = micrograms per liter

# ADEQ Perchlorate Occurrence Study in Drinking Water Sources
## Phoenix Municipal Water Sampling Sites
## Table 2

| Site Number | Zip Code | Perchlorate Level | Sample Locations | Sample Site | GPS Coordinates |
|---|---|---|---|---|---|
| 110 | 85263 | No Detect (<4 ppb) | Granite Reef Diversion Dam | Downstream of Dam | 33° 31' 3.214" N<br>111° 41' 28.617" W |
| 111 | 85263 | No Detect (<4 ppb) | Salt River/Bush Hwy. (Blue Point Bridge) | Upstream of Granite Reef Dam | 33° 33' 15.041" N<br>111° 34' 28.466" W |
| 112 | 85263 | No Detect (<4 ppb) | Verde River - Beeline Hwy. Bridge | Upstream of Granite Reef Dam | 33° 34' 50.893" N<br>111° 40' 13.983" W |

ppb = parts per billion = $\mu$g/l = micrograms per liter

ADEQ Perchlorate Occurrence Study in Drinking Water Sources
Phoenix Municipal Water Sampling Sites
Table 2a

| Site Number | Zip Code | Sample Locations (General Location Description) | Sample Date | Sample Time (24 hr) | Air Temp (Celsius) | Sample Depth (meters) | Water Temp (Celsius) | Conductivity ($\mu$siemens/cm) |
|---|---|---|---|---|---|---|---|---|
| 41 | 85264 | Verde Wells | Not Sampled | | | | | |
| 42 | 85264 | Verde Wells | Not Sampled | | | | | |
| 43 | 85264 | Verde Wells | Not Sampled | | | | | |
| 44 | 85264 | Verde Wells | Not Sampled | | | | | |
| 45 | 85264 | Verde Wells | Not Sampled | | | | | |
| 46 | 85264 | Verde Wells | Not Sampled | | | | | |
| 47 | 85264 | Verde Wells | Not Sampled | | | | | |
| 48 | 85264 | Verde Wells & Ft. McDowell Rd | Not Sampled | | | | | |
| 49 | 85264 | Verde Wells & Beeline Hwy. | Not Sampled | | | | | |
| 50 | 85264 | Verde Wells & Beeline Hwy. | Not Sampled | | | | | |
| 51 | 85264 | Verde Wells & Beeline Hwy. | Not Sampled | | | | | |
| 52 | 85264 | Verde Wells | Not Sampled | | | | | |
| 53 | 85264 | Verde Wells & Ft. McDowell Rd | Not Sampled | | | | | |

** = No data available or No data collected for this data field.



1meter = 39.37 inches

ADEQ Perchlorate Occurrence Study in Drinking Water Sources
Phoenix Municipal Water Sampling Sites
Table 2a

| Site Number | Zip Code | Sample Locations (General Location Description) | Sample Date | Sample Time (24 hr) | Air Temp (Celsius) | Sample Depth (meters) | Water Temp (Celsius) | Conductivity ($\mu$siemens/cm) |
|---|---|---|---|---|---|---|---|---|
| 54 | 85017 | 5126 North 37th Avenue | Not Sampled | | | | | |
| 54A | 85017 | 5126 North 37th Avenue | Aug 3, 1999 | 11:00 | ** | Groundwater Well | 36.2 | 820 |
| 55 | 85264 | Verde Treatment Plant (Storage Tank) | Aug 18, 1999 | 12:30 | ** | Groundwater Well | 27 | ** |
| 56 | 85021 | Dear Valley Treatment Plant | Not Sampled | | | | | |
| 57 | 85021 | 1621 West Palmer | Not Sampled | | | | | |
| 57A | 85021 | 1621 West Palmer | Aug 4, 1999 | 10:45 | ** | Groundwater Well | 25.5 | ** |
| 58 | 85032 | 4138 East Greenway Road | Out of Service | | | | | |
| 58A | 85032 | 4138 East Greenway Road | Out of Service | | | | | |
| 59 | 85051 | 3030 West Dunlap | Not Sampled | | | | | |
| 60 | 85051 | 3030 West Dunlap | Not Sampled | | | | | |
| 61 | 85306 | 4375 West Acoma Drive | Out of Service | | | | | |
| 61A | 85306 | 4375 West Acoma Drive | Out of Service | | | | | |

** = No data available or No data collected for this data field.



1meter = 39.37 inches

ADEQ Perchlorate Occurrence Study in Drinking Water Sources
Phoenix Municipal Water Sampling Sites
Table 2a

| Site Number | Zip Code | Sample Locations (General Location Description) | Sample Date | Sample Time (24 hr) | Air Temp (Celsius) | Sample Depth (meters) | Water Temp (Celsius) | Conductivity ($\mu$siemens/cm) |
|---|---|---|---|---|---|---|---|---|
| 62 | 85226 | 16630 South 54th Street | Not Sampled | | | | | |
| 63 | 85226 | 5226 East Pecos Road | Not Sampled | | | | | |
| 64 | 85254 | 10831 North 56th Street | Not Sampled | | | | | |
| 64A | 85254 | 10831 North 56th Street | Aug 23, 1999 | 09:00 | ** | Groundwater Well | 31.9 | ** |
| 65 | 85254 | 10801 North 56th Street | Not Sampled | | | | | |
| 65A | 85254 | 10801 North 56th Street | Aug 24, 1999 | 09:15 | ** | Groundwater Well | 33.1 | ** |
| 66 | 85253 | 5356 East Double Tree Road | Out of Service | | | | | |
| 66A | 85253 | 5356 East Double Tree Road | Out of Service | | | | | |
| 67 | 85253 | 6026 East Caballo Drive | Not Sampled | | | | | |
| 67A | 85253 | 6026 East Caballo Drive | Aug 23, 1999 | 11:15 | ** | Groundwater Well | 33 | ** |
| 68 | 85051 | 3030 West Dunlap | Not Sampled | | | | | |
| 69 | 85226 | 5280 East Pecos Road | Not Sampled | | | | | |

** = No data available or No data collected for this data field.



1meter = 39.37 inches

ADEQ Perchlorate Occurrence Study in Drinking Water Sources
Phoenix Municipal Water Sampling Sites
Table 2a

| Site Number | Zip Code | Sample Locations (General Location Description) | Sample Date | Sample Time (24 hr) | Air Temp (Celsius) | Sample Depth (meters) | Water Temp (Celsius) | Conductivity ($\mu$siemens/cm) |
|---|---|---|---|---|---|---|---|---|
| 70 | 85254 | 5602 East Bell Road | Not Sampled | | | | | |
| 70A | 85254 | 5602 East Bell Road | Aug 25, 1999 | 11:15 | ** | Groundwater Well | 35 | ** |
| 71 | 85053 | 18419 North 29th Drive | Out of Service | | | | | |
| 71A | 85053 | 18419 North 28th Drive | Out of Service | | | | | |
| 72 | 85306 | 16820 North 47th Avenue | Not Sampled | | | | | |
| 72A | 85306 | 16820 North 47th Avenue | Aug 9, 1999 | 10:15 | ** | Groundwater Well | 36.1 | ** |
| 73 | 85027 | 3308 West Kristal Way | Not Sampled | | | | | |
| 73A | 85027 | 3308 West Kristal Way | Aug 24, 1999 | 11:15 | ** | Groundwater Well | 32.5 | ** |
| 74 | 85308 | 3615 West Deer Valley Road | Not Sampled | | | | | |
| 74A | 85308 | 3615 West Deer Valley Road | Sept 15, 1999 | 11:20 | 30 | Groundwater Well | 27.8 | 440 |
| 75 | 85310 | 24439 North 23rd Avenue | Not Sampled | | | | | |

** = No data available or No data collected for this data field.



1meter = 39.37 inches

ADEQ Perchlorate Occurrence Study in Drinking Water Sources
Phoenix Municipal Water Sampling Sites
Table 2a

| Site Number | Zip Code | Sample Locations (General Location Description) | Sample Date | Sample Time (24 hr) | Air Temp (Celsius) | Sample Depth (meters) | Water Temp (Celsius) | Conductivity ($\mu$siemens/cm) |
|---|---|---|---|---|---|---|---|---|
| 75A | 85310 | 24439 North 23rd Avenue | Not Sampled | | | | | |
| 76 | 85054 | 20805 North 56th Street | Not Sampled | | | | | |
| 76A | 85054 | 20805 North 56th Street | Sept 8, 1999 | 10:20 | 33 | Groundwater Well | 32 | 980 |
| 77 | 85310 | 28825 North 28th Avenue | Not Sampled | | | | | |
| 77A | 85310 | 28825 North 28th Avenue | Not Sampled | | | | | |
| 78 | 85254 | 6714 East Juniper Avenue | Out of Service | | | | | |
| 78A | 85254 | 6715 East Juniper Avenue | Out of Service | | | | | |
| 79 | 85054 | 5746 East St. Johns | Not Sampled | | | | | |
| 79A | 85054 | 5746 East St. Johns | Aug 25, 1999 | 09:30 | ** | Groundwater Well | 33.3 | ** |
| 80 | 85331 | 29402 North 44th Street | Not Sampled | | | | | |
| 80A | 85331 | 29402 North 44th Street | Aug 31, 1999 | 12:45 | 38 | Groundwater Well | 32 | 510 |
| 81 | 85331 | 4390 North Rancho Tierra | Not Sampled | | | | | |

** = No data available or No data collected for this data field.



1meter = 39.37 inches

ADEQ Perchlorate Occurrence Study in Drinking Water Sources
Phoenix Municipal Water Sampling Sites
Table 2a

| Site Number | Zip Code | Sample Locations (General Location Description) | Sample Date | Sample Time (24 hr) | Air Temp (Celsius) | Sample Depth (meters) | Water Temp (Celsius) | Conductivity ($\mu$siemens/cm) |
|---|---|---|---|---|---|---|---|---|
| 81A | 85331 | 4390 North Rancho Tierra | Aug 30, 1999 | 12:55 | 38 | Groundwater Well | 29.5 | ** |
| 82 | 85331 | 33005 North 51st Street | Not Sampled | | | | | |
| 82A | 85331 | 33005 North 51st Street | Sept 7, 1999 | 12:35 | 40 | Groundwater Well | 32 | 680 |
| 83 | 85339 | 8200 South 56th Avenue | Not Sampled | | | | | |
| 83A | 85339 | 8200 South 56th Avenue | Aug 3, 1999 | 08:30 | ** | Groundwater Well | 27.8 | ** |
| 84 | 85331 | 28401 North Tatum Blvd. | Not Sampled | | | | | |
| 84A | 85331 | 28401 North Tatum Blvd. | Aug 31, 1999 | 09:15 | 34 | Groundwater Well | 30 | 560 |
| 85 | 85331 | 28606 North 56th Street | Not Sampled | | | | | |
| 85A | 85331 | 28606 North 56th Street | Sept 1, 1999 | 09:45 | 30 | Groundwater Well | 29.2 | 474 |
| 86 | 85024 | 26231 North 32nd Street | Not Sampled | | | | | |

** = No data available or No data collected for this data field.



1meter = 39.37 inches

ADEQ Perchlorate Occurrence Study in Drinking Water Sources
Phoenix Municipal Water Sampling Sites
Table 2a

| Site Number | Zip Code | Sample Locations (General Location Description) | Sample Date | Sample Time (24 hr) | Air Temp (Celsius) | Sample Depth (meters) | Water Temp (Celsius) | Conductivity ($\mu$siemens/cm) |
|---|---|---|---|---|---|---|---|---|
| 86A | 85024 | 26231 North 32nd Street | Sept 7, 1999 | 10:35 | 38 | Groundwater Well | 32 | 490 |
| 87 | 85024 | 26268 North Tatum Blvd. | Not Sampled | | | | | |
| 87A | 85024 | 26268 North Tatum Blvd. | Aug 11, 1999 | 11:30 | ** | Groundwater Well | 30.5 | ** |
| 88 | 85050 | 21425 North Tatum Blvd. | Not Sampled | | | | | |
| 88A | 85050 | 21425 North Tatum Blvd. | Sept 15, 1999 | 09:50 | 30 | Groundwater Well | 28.5 | 1270 |
| 89 | 85044 | 48th Street and Ray Road N/W corner | Sept 14, 1999 | 10:55 | 41 | Groundwater Well | 30.9 | 1730 |
| 90 | 85051 | Dear Valley Treatment Plant (Headworks) | Not Sampled | | | | | |
| 91 | 85051 | Dear Valley Treatment Plant (Finished Water) | Aug 8, 1999 | 12:15 | ** | ** | 29.4 | ** |
| 92 | 85051 | Dear Valley Treatment Plant (Reservoir Inlet Bldg.) | Aug 8, 1999 | 11:45 | ** | ** | 29.4 | ** |

** = No data available or No data collected for this data field.



1meter = 39.37 inches

ADEQ Perchlorate Occurrence Study in Drinking Water Sources
Phoenix Municipal Water Sampling Sites
Table 2a

| Site Number | Zip Code | Sample Locations (General Location Description) | Sample Date | Sample Time (24 hr) | Air Temp (Celsius) | Sample Depth (meters) | Water Temp (Celsius) | Conductivity ($\mu$siemens/cm) |
|---|---|---|---|---|---|---|---|---|
| 93 | 85016 | Squaw Peak Treatment Plant (Raw Water) | Sept 16, 1999 | 10:15 | 35 | 1.5 | 26 | 1420 |
| 94 | 85016 | Squaw Peak Treatment Plant (Filter Bldg. # 6) | Not Sampled | | | | | |
| 95 | 85016 | Squaw Peak Treatment Plant (J-Box Point of Entry) | Sept 16, 1999 | 11:00 | 25 | ** | 30.6 | 1270 |
| 96 | 85213 | Val Vista Treatment Plant (Raw Water) | Sept 14, 1999 | 12:20 | 40 | ** | 24.9 | 1230 |
| 97 | 85213 | Val Vista Treatment Plant (Finished Water) | Sept 14, 1999 | 13:15 | 39 | ** | 29.9 | 1230 |
| 98 | 85027 | Union Hills Treatment Plant (Raw Water) | Sept 8, 1999 | 11:50 | 29 | ** | 25 | 1040 |
| 99 | 85027 | Union Hills Treatment Plant (Finished Water, MOD 1) | Sept 8, 1999 | 12:20 | 25 | ** | 22 | 990 |
| 100 | 85027 | Union Hills Treatment Plant (Finished Water, MOD 2) | Sept 8, 1999 | 12:30 | 26 | ** | 20 | 970 |

** = No data available or No data collected for this data field.



1meter = 39.37 inches

ADEQ Perchlorate Occurrence Study in Drinking Water Sources
Phoenix Municipal Water Sampling Sites
Table 2a

| Site Number | Zip Code | Sample Locations (General Location Description) | Sample Date | Sample Time (24 hr) | Air Temp (Celsius) | Sample Depth (meters) | Water Temp (Celsius) | Conductivity ($\mu$siemens/cm) |
|---|---|---|---|---|---|---|---|---|
| 101 | 85264 | Verde Treatment Plant (Raw Water) - Out of Service | Out of Service | | | | | |
| 102 | 85264 | Verde Treatment Plant (Finished Water) - Out of Service | Out of Service | | | | | |
| 103 | 85344 | Colorado River | July 13, 1999 | 07:00 | 26.1 | 1.8 | 28 | 899 |
| 104 | 86404 | Lake Havasu City Well #15 | Sept 21, 1999 | 09:00 | 30 | 152 | 22.7 | 1110 |
| 105 | 86404 | Lake Havasu City Well #16 | Sept 21, 1999 | 08:00 | 30 | 38 | 26.6 | 1770 |
| 106 | 85382 | Lake Pleasant | July 14, 1999 | 10:30 | 35 | ** | 17.6 | 780 |
| 107 | 85382 | Lake Pleasant Upstream | Aug 20, 1999 | 14:30 | 30 | 1.2 | 31.7 | 910 |
| 108 | 85382 | Lake Pleasant Downstream | Aug 20, 1999 | 13:45 | 38 | 0.9 | 21.6 | 970 |
| 109 | 85215 | CAP Canal/Power Road | Aug 20, 1999 | 11:30 | 38 | 0.9 | 22.6 | 920 |
| 110 | 85263 | Granite Reef Diversion Dam | Sept 23, 1999 | 10:30 | 33 | 1.5 | 26.8 | 1260 |
| 111 | 85263 | Salt River/Bush Hwy. (Blue Point Bridge) | Sept 24, 1999 | 13:15 | 35 | 0.8 | 27 | 1190 |
| 112 | 85263 | Verde River-Beeline Hwy. Bridge | Sept 23, 1999 | 12:00 | 34 | 0.9 | 31.5 | 560 |

** = No data available or No data collected for this data field.

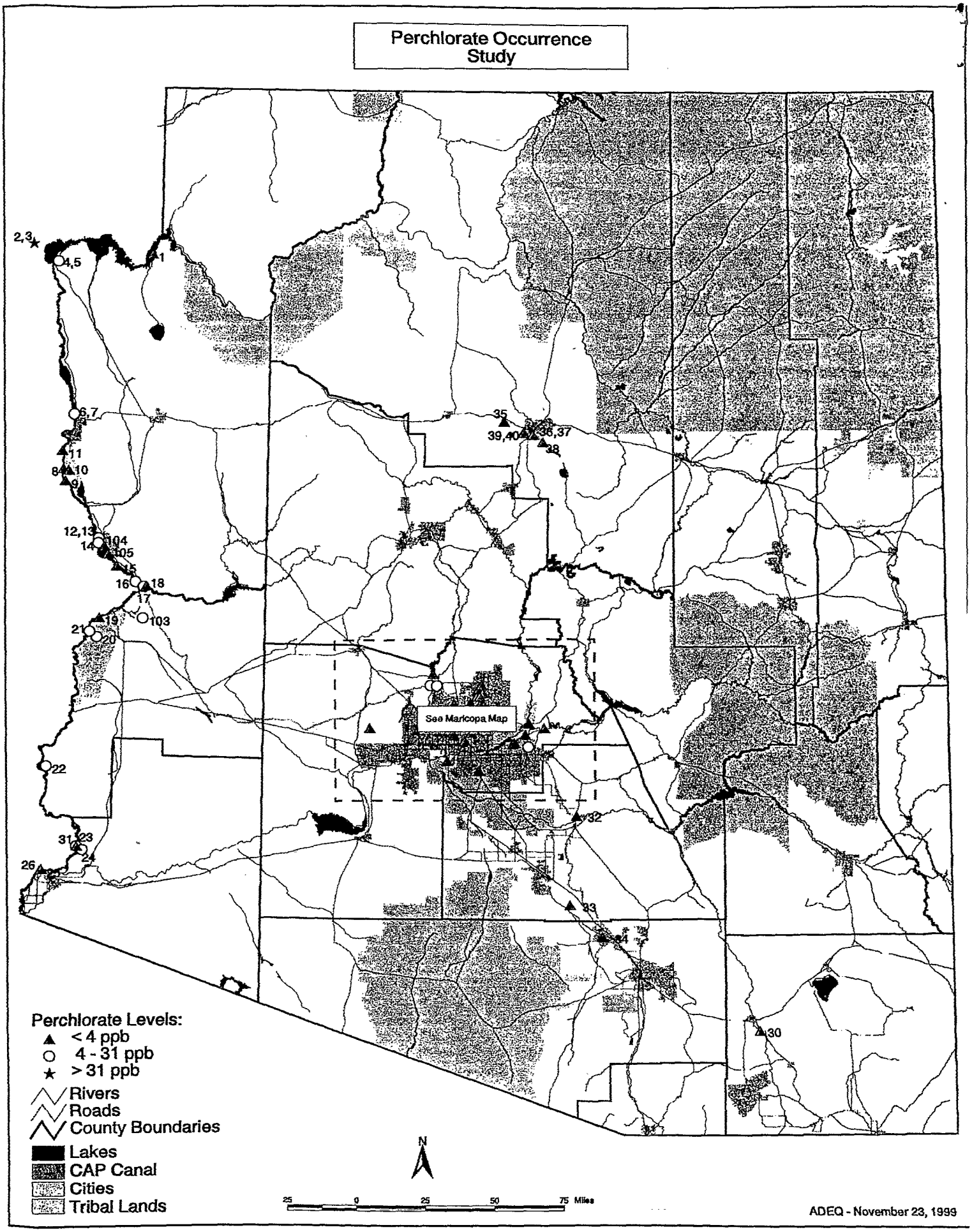


1meter = 39.37 inches

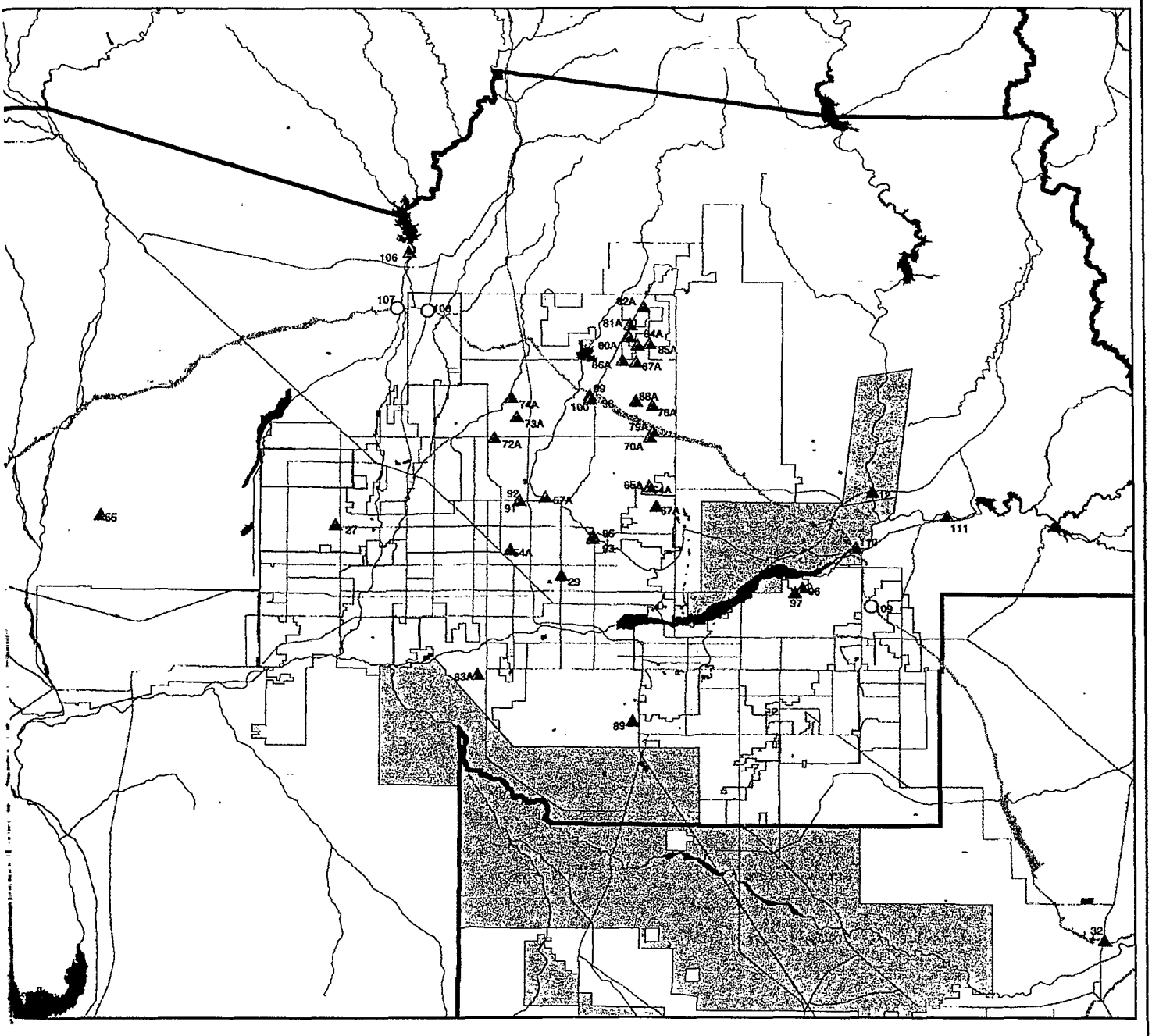
# Occurrence Data Maps

These maps were created using GPS data and occurrence data collected during various sampling trips. After inputting location and occurrence data by site number, several "covers" were added in order to provide reference points. These covers included municipal boundaries, roads, surface water features, the CAP canal and Tribal Lands.

One note on site locations: the state-wide map only shows features within Arizona's boundaries. Therefore, some points that appear to be off the map are actually across the border in other states (i.e. points 2 and 3 are actually on the Nevada side of Lake Mead).


Perchlorate Occurrence Study
2,3
4,5
1
6,7
11
8
10
9
12,13
14
104
105
15
16
18
17
21
19
103
20
See Maricopa Map
22
31
23
24
26
35
39,40
36,37
38
32
33
4
30
Perchlorate Levels:
< 4 ppb
4 - 31 ppb
> 31 ppb
Rivers
Roads
County Boundaries
Lakes
CAP Canal
Cities
Tribal Lands
N
25 0 25 50 75 Miles
ADEQ - November 23, 1999

# Perchlorate Occurrance Study
# Maricopa County



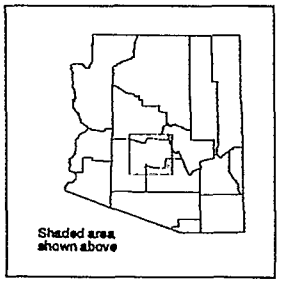

Perchlorate Levels:
- ▲ < 4 ppb
- ○ 4 - 31 ppb
- ★ > 31 ppb

Streams
County Boundaries
Major Roads

Metro Phoenix
CAP Canal
Lakes
Tribal Lands

N

5 0 5 10 15 20 Miles




ADEQ - November 23, 1999

# Field Equipment Used

**I.** Portable Conductivity/pH meter/Temp

LaMotte CDS 5000

| | |
|---|---|
| Range: | 1 - 199.9 $\mu$S/cm |
| | 200 - 1999 $\mu$S/cm |
| | 2 - 19.99 mS/cm |
| | 20 - 199.9 mS/cm |
| | 0 - 100 °C |
| Resolution: | ±0.1 |
| | ±1 |
| | ±10 |
| | ±100 |
| Probe: | Carbon electrode |
| Power: | 9 volt alkaline battery |
| Calibration: | HF Scientific Inc. 0.02 NTU. Lot number 40204 |

**II.** Portable Turbidity Meter

HF Scientific DRT-15 C

| | |
|---|---|
| Range: | 0-20 Nephlometric Turbidity Units (NTU) |
| | 0-200 Nephlometric Turbidity Units (NTU) |
| Linearity: | (+ or -) 1% of Full Scale on either range |
| Repeatability: | (+ or -) 1% of Full Scale on either range |
| Power: | 9 volt alkaline battery |
| Operating Temperature: | 0-50 °C (32 - 122 °F) |
| Calibration: | Advanced Polymer Systems Standards |
| | CAS Number 9003-70-7; MSDS Number A002-01 |
| | 0.0 NTU (Styrene Divinyl Benzene Copolymer Bead <1%, Deionized Reverse Osmosis Water >99%) |
| | 19.8 NTU (Styrene Divinyl Benzene Copolymer Bead <1%, Deionized Reverse Osmosis Water >99%) |
| | 198 NTU (Styrene Divinyl Benzene Copolymer Bead <1%, Deionized Reverse Osmosis Water >99%) |

## Field Equipment Used (Continued)

**III.** Portable pH/Temperature Meter
VWR Scientific model 2000

| | |
|---|---|
| Range: | 0.000 to 14.00 pH |
| | ± 1600 mV |
| | 0.0 to 100.00 °C |
| Resolution: | 0.01 / 0.1 pH |
| | 1 mV |
| | 0.1 °C |
| Power: | 9 volt alkaline battery |
| Probe: | Electrode, pH, Epoxy Combo, VWR 34105-023 |
| Calibration: | Standards of pH Buffers from Arizona State Laboratory |

**IV.** Water Sampler on loan from EPA Region IX
Horizontal Van Dorn Bottle.

**V.** Global Positioning System Receiver
Trimbal Basic Plus; Trimbal Navigation Limited.
Property of ADEQ Drinking Water Section.

# Acronyms and Definitions

| | |
|---|---|
| **ADEQ** | Arizona Department of Environmental Quality. State Agency whose responsibility is to implement environmental and public health programs promulgated by the Environmental Protection Agency. |
| **ADHS** | Arizona Department of Health Services. State Agency whose responsibility includes but is not limited to public health oversite, risk analysis research, and community health education. Located in Phoenix, Arizona. |
| **ASUA** | Arizona Small Utilities Association. A non-profit organization located in Tucson, Arizona whose membership includes rural and urban water utilities serving 10,000 or fewer persons. |
| **CAP** | Central Arizona Poject. Canal system bringing Colorado River water to Phoenix and Tucson. |
| **conductivity** | The ability of a solution to conduct an electrical current. The current is conducted by electrically charged particles called ions. Conductivity is measured in microsiemens/centimeter. |
| **EPA** | Environmental Protection Agency. Arizona is within EPA Region IX, whose office is located in San Francisco, CA. |
| **GPS** | Global Positioning System. A satellite receiver that can mathematically determine a precise geographic position by processing signals from a minimum of four NAVSTAR satellites simultaneously. The ADEQ GPS units uses the Department of Defense navigation satellite time and ranging system consisting of 24 orbiting GPS satellites that provide 24 hour, all weather navigation and surveying capabilities. |
| **HBGL** | Health Based Guidance Level; statistically set using health risk studies and estimates. |
| **IPSC** | Interagency Perchlorate Steering Committee. Group created and chaired by the EPA consisting of environmental professionals, state agencies, federal agencies, universities, environmental groups, Bureau of Indian Affairs, Indian Tribes and Nations with a goal of sharing information and knowledge on issues relating to perchlorate. |
| **ITCA** | Intertribal Council of Arizona, Environmental & Natural Resources Programs. Mission: . to provide member tribes with the means for action on matters that affect them collectively and individually, to promote tribal sovereignty and to strengthen tribal governments. Established in 1952. |
| **ppb** | Parts per billion. One ppb is equal to one penny in ten million dollars. |
| **SRO** | Southern Regional Office of the Arizona Department of Environmental Quality. SRO is located in Tucson, Arizona. |
| **NRO** | Northern Regional Office of the Arizona Department of Environmental Quality. NRO is located in Flagstaff, Arizona. |

# Bibliography

U.S. Environmental Protection Agency. (December 31, 1998) Perchlorate Environmental Contamination: Toxicological Review and Risk Characterization Based on Emerging Information. Washington, D.C.: National Center for Environmental Assessment, Office of Research and Development; report number NCEA-1-0503. Available online at: www.epa.gov/ncea/perch.htm

Professor Paul Westerhoff, Ph.D, Assistant Professor, Arizona State University. (July 1998). Shan Miller, Graduate Student Project on Perchlorate. College of Engineering and Applied Sciences, Department of Civil and Environmental Engineering. CEE 590.
e-mail: p.westerhoff@asu.edu.

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# Appendix A

## ADHS Provisional Health Base Guidance Level Letter - dated March 15, 1999

The attached letter was written as a response to inquires from the SRO of ADEQ. This level is intended to be a guide only. Currently the EPA has not set a final Maximum Contaminant Level for Perchlorate. ADEQ is waiting for the EPA to set a final level based on toxicological assessments. The EPA is also evaluating possible rule development for Perchlorates in drinking water.

Arizona Department of Health Services

*Bureau of Epidemiology and Disease Control Services*
*Office of Environmental Health*

3815 North Black Canyon Highway
Phoenix, Arizona 85015-5351
(602) 230-5830
(602) 230-5933 FAX

JANE DEE HULL, GOVERNOR
JAMES R. ALLEN, M.D., M.P.H., DIRECTOR



March 15, 1999

Mr. William Ellett
Arizona Department of Environmental Quality
Southern Regional Office
400 West Congress, Suite 433
Tucson, Arizona 85701

Dear Mr. Ellett:

**RE: PROVISIONAL HBGL FOR PERCHLORATE**

The Arizona Department of Health Services (ADHS) has developed a provisional drinking water Human Health-based Guidance Level (HBGL) for perchlorate of 31 $\mu$g/L. This HBGL was calculated using the default ADHS formula and the provisional reference dose (RfD) from the United States Environmental Protection Agency (USEPA) document entitled "*Perchlorate Environmental Contamination: Toxicological Review and Risk Characterization Based on Emerging Information*" dated December 31, 1998. We did not use a relative source contribution in the calculations since perchlorate is a rare contaminant in soils, air, and foods.

The USEPA indicated in the source document that the RfD is provisional. Additional toxicological information is forthcoming that may change the RfD. We are following the toxicological research closely, and will update the HBGL as appropriate.

Sincerely,

Will Humble, MPH
Chief,
Office of Environmental Health

WH:ps

cc: Lee Bland, BEDCS
Mason Bolitho, ADWR
Dale Ohnmeiss, ADEQ
Chuck Graf, ADEQ

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